

Description

Switched connection system with access to its resources via the Internet

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The subject matter of the application relates to a switched connection system with access to its resources ^{own} ~~by means of~~ ^{v.a} the Internet. ^{Description of the Related Art}

^{clearly indicates} In view of the exponential growth of the Internet and the increasing trend to use it, ^{it is} ~~it is~~ ^{overall network} clear that the Internet will become the ~~network of~~ ^{of smaller networks.} The other worldwide network, namely the public telephone network PSTN (~~A~~ Public Switched Telephone Network), and the Internet are becoming closely inter-related and each can benefit from the other. In particular, the Internet can benefit from the PSTN network because ^{of extensive} ~~the intelligence and the resources~~ in the PSTN network ~~are extensive~~. The Internet has been slow in making full use of the extensive intelligence in the switching nodes because the interface between the PSTN and the Internet is not clearly defined. Even after a clear interface has been defined, the cost in the switching nodes is too high to be justified. ^{because} ~~This is due to the fact that~~ the costs to implement a feature in a switching node are very much higher than in a PC (personal computer). The problem is how to bring together the two technologies and provide Internet features with access to the intelligence and the resources of the PSTN network at a minimum cost.

^{the present} At ~~the moment~~ it is very difficult to use the resources of a switching node for Internet services. Examples of ^{these} ~~resources in the switching nodes~~ ^{include} are call control, switching, administration of basic data (database), hardware information, etc. One approach to arriving at a solution is based on developing new application programs and new interfaces in the switching nodes

which provide external applications with access to the resources in the PSTN switching node. This is technically possible, but the associated financial cost is very high.

WO 97/22209 discloses an intelligent network which is connected to the Internet via its service control point. In this system, the resources for services are stored on a server which can be accessed via the Internet, providing worldwide access.

SUMMARY OF THE INVENTION

Ins. A1 ~~The subject matter of the application is based on the object of specifying a system which permits Internet applications to access resources of the switching node. A further object of the present application is to indicate how the Internet can use the resources in the PSTN switching nodes at minimum cost.~~ *and to implement*
a number of
~~It is also shown how a number of features occupied with the Internet which are not yet available can be implemented by means of the subject matter of the application. A further object of the present subject matter of the application is to indicate how the high expenditure which has previously been necessary to enable the Internet to access resources in the switching node can be drastically reduced.~~

Ins. A2 ~~The object is achieved by the independent patent claims.~~

invention provides
 The ~~subject matter of the application provides~~ the Internet with access to the existing resources and to the intelligence in the switched connection network PSTN, *Operator* ~~in which case, to a large extent, operator functions which are in any case already present can be utilized in the implementation and the additional cost is low. The subject matter of the application forms the basis for features which require interaction between the switched connection network PSTN and the Internet network.~~ *Present invention forms the* *largely*

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Further advantageous developments of the subject matter of the application are given in the independent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the application is explained in more detail below as an exemplary embodiment to a degree which is necessary for comprehension, and with reference to figures, where:

which provide external applications with access to the resources in the PSTN switching node. This is technically possible, but the associated financial cost is very high.

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10 resources in the PSTN switching nodes at minimum cost. It is also shown how a number of features occupied with the Internet which are not yet available can be implemented by means of the subject matter of the application. A further object of the present subject
15 matter of the application is to indicate how the high expenditure which has previously been necessary to enable the Internet to access resources in the switching node can be drastically reduced.

20 The object is achieved by the independent patent claims.

25 The subject matter of the application provides the Internet with access to the existing resources and to the intelligence in the switched connection network PSTN, in which case, to a large extent, operator functions which are in any case already present can be
30 utilized in the implementation and the additional cost is low. The subject matter of the application forms the basis for features which require interaction between the switched connection network PSTN and the Internet network.

 Further advantageous developments of the subject matter of the application are given in the independent claims.

35 The subject matter of the application is explained in more detail below as an exemplary embodiment to a degree which is necessary for comprehension, and with reference to figures, where:

Fig. 1 ^{is a schematic diagram showing} ~~shows~~ a basic illustration of ^{the invention} ~~an~~ interconnection, which implements the invention, of a PSTN with the Internet.
 Fig. 2 ^{is a schematic diagram showing} ~~shows~~ a basic illustration of ^{an inventive structure} ~~a structure~~ which is typical of the invention and in which a switching device is connected to a network control platform, and
 Fig. 3 ^{is a schematic diagram showing} ~~shows~~ a basic illustration of a conventional structure of a switched connection network PSTN.

In the figures, identical elements are designated by identical reference numerals.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 3 shows a conventional switching device SW (A switch) to which a subscriber terminating device TE-A is connected via a two-wire connecting line a/b, and to which ~~also~~ a subscriber terminating device TE-B which is controlled via an ISDN BA from an operator console OSS (~~/~~ Operator Service System) is connected. The interface may be of the type ISDN BA (Integrated Services Digital Network Basic Access) Level 3. The subscriber terminating devices are illustrated by way of example for all known subscriber terminating devices. ^{Programs} ~~Programme~~ for applications are installed in the operator console by the operator OA (~~/~~ Operator Application).

Fig. 2 shows, on the left-hand side, a basic illustration of a switching node SW which has a structural design SW_HW (~~/~~ Switch Hardware), functions MW (~~/~~ Middleware) and application programs AP1 (~~/~~ Application). On the right-hand side in Fig. 2 ^{Shows} ~~there is~~ a basic illustration of an operator console OSS which has a structural design PC_HW (~~/~~ Personal Computer Hardware), an interface SW-API (~~/~~ switch application programming interface) and application programs ~~/~~AP2 (~~/~~ Application). According to the application, the operator console is expanded with applications 3P_AP_PLT (~~/~~ third party application

below. The list discloses a wide range of features which are conventionally not available to one subscriber.

5 Operator feature requirements

- Call requesters. A calling subscriber can request the services of the operator by selecting the LAC/DN (Local Area Code/Directory Number) of the operator.
- 10 - Qsi (Quasi) automatic call permits subscribers of a local exchange to set up wide-area traffic connections by ~~themselves~~ dialing the DN (Directory Number) for the service and the number of the B subscriber (subscriber to be called),
15 although the call is directed to an operator for an operator service and an A subscriber connection number, identification and checking.
- Transfer to the operator. ^{This involves the} ~~The~~ transfer of the call to the operator in cases where the operator's help is needed, for example, in the case of an ANI (Automatic Number Identification) error.
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- Call acceptance/call presentation
- Manual acceptance. ^{This involves operator} ~~Operator~~ measures necessary to accept the call from the switch node.
- 25 - Automatic acceptance. ^{This involves operator} ~~Operator~~ measures ^{that} are not necessary to accept the call from the switching node.
- Automatic greeting. After a call has been connected to an operator, ^{this} ~~the~~ feature permits the
30 operator to send the greetings formula to the calling subscriber from an INDAS (~~/~~ Individual Digital Announcement Machine) record, instead of being forced to ^{literally} repeat the standard formula ~~literally~~ for each call.
- 35 Call forwarding. Call forwarding refers to the diverting of a call by the operator

to another subscriber.

- Requested call forwarding. Requested call forwarding refers to the extension of a call by the

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operator while the calling A subscriber remains connected to the operator.

- Delayed call forwarding.

Delayed call handling: This feature permits the operator to delay the handling and placing of calls to a later time, for example, at the request of the subscriber. DCH (Delayed Call Handling) provides the following possibilities:

- registration of a call,
- 10 - searching for a registered call,
- changing details of the registration,
- carrying out the call at the time provided or, if necessary, call forwarding devices, available.

Forwarding a call: The call holding feature permits an operator who is occupied with an existing call to remain connected to the call ^{while handling} ~~and nevertheless handle~~ another call. If the operator holds a set-up A subscriber to the operator for a B subscriber call, the system puts the call into the holding state, i.e., both 20 the A subscriber and the B subscriber remain connected to their actuated speech path and only the operator is removed from the call.

Call handling devices

- 25 - Notification of the duration of a call. If requested by a subscriber who is involved in the call, the operator can mark a call for notification. This can be a verbal operator notification or notification ^{Via} ~~by means of~~ a special signal tone.
- 30 - Automatic call duration limitation (ACDL). If requested by a subscriber who is participating in a call, the operator ^{can mark} ~~marks~~ the call for ACDL and ^{enter} ~~enters~~ the duration. The system supplies a signal tone to a

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which is
short time in advance/ specified by the administration,
in order to warn both parties that their requested time
interval has expired. At the end of the requested time
interval, the system ends the call.

- 5 - Simulated response. If the response signal is not
received from the B end of the call although the B
subscriber is already connected, the operator can
simulate the response signal by manual measures.
- 10 - Toll metering. The operator can update AMA
(~~/~~ Automatic Message Accounting) cards and
initiate and/or terminate the toll metering period
for activated calls. Call tolls can be charged to
the toll account of a third party.
- 15 - Local access to the database. The operator has
access to the local database.
- 20 - Call partition. The partition function permits the
operator to interrupt the communication with a
specific subscriber of the activated call (to
interrupt either the A subscriber or the B
subscriber). The activated call in this case may
be a three-way conversation. In this case, the
three-way conversation is partitioned, the
specific subscriber is placed in the holding
function and the other subscriber remains in an
25 activated connection to the operator.
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30 - Checking functions. There are various checking
possibilities, ^{including} ~~these include~~ checking the call
number of the A subscriber, checking the number of
the call toll account (when the call tolls are
charged to a third party), ^{and} checking the busy
state. ^{Also, offering} ~~offering~~ in a connecting line. ~~This~~ enables
the operator to offer the call to a busy
subscriber.
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35 - Repeated attempt in a busy state. The operator can
make ^{additional attempts} ~~another attempt~~ at switching, allowing for a
busy state of a trunked channel, by releasing the
connection and setting up the connection again.

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Graphic display/representation of traffic and performance statistics and reports. ^{can be provided, as well as different} ~~Different~~ performance reports ~~are available.~~

According to the ~~application~~ ^{invention}, access to the switching node and the network resources is provided for a subscriber device.

Fig. 1 shows an Internet user IU who has set up a connection to his Internet provider ISP POP via the switching node SW in accordance with the Internet Protocol IP. The Internet provider has a connection to the Internet GI (~~/~~ Global Internet). The operator console NCP, ^{AA} which is extended with additional applications, ¹ has a direct connection to the Internet. A service agent SA is connected to the switching node via a two-wire line a/b.

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The idea on which the ~~application~~ ^{invention} is based relies on the use of the existing interface between the OSS and the switching node in order to connect the switched connection network PSTN and the Internet. In particular, the software implemented in the switching node is used for the OSS as middleware, and the third-party applications which are arranged on external platforms are provided with the possibility of accessing this middleware. This makes it possible for the Internet to use the resources and the intelligence in the PSTN network and permits it to develop features which require interaction between the PSTN and the Internet network.

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Access ^{is also provided} to the ~~middle-ware~~ ^{middle ware} in the switching node.

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The ~~patent application~~ ^{invention is also} is based on the idea of transferring (porting) the OSS software to a Windows NT platform, and of adding applications which carry out the conventional operator functions automatically. In addition, new applications can be added which function as a proxy agent between the

Internet and the PSTN network. The connection between the operator console as ^a proxy and the Internet could have, for example, a transmission rate of 64 kbit/s. A conventional operator console OSS which is extended with the features according to the application is referred to as ^a NCP (Network Control Platform). The essential functions of an OSS platform which ^a NCP platform uses are:

- call forwarding,
- 10 - offering a connecting line for an active subscriber,
- operating ~~of~~ the connection billing information,
- repetition in the event of a line being busy;
- delayed call ^{diversion} ~~divert~~.

15 The NCP uses the existing basic access interface to the switching node and has a TCP/IP (Transmission Control Protocol/Internet Protocol) ^{which is} a communications protocol defined by the US Defence Department for connections and exchanging data in different computer networks) connection to the Internet. The additional expenditure on the switching node, ^{in this invention,} is low because almost all ^{of} the functions required have already been implemented. A third party application can be communicated by using predefined APIs and providing access to all ^{of} the resources in the switching node.

The application of the present invention to the features described above permits ^{use of} Internet features which have previously only been possible at ^a high cost. Examples of such features are given below.

30 ~~According to a first embodiment, there is~~ switching between an Internet session and acceptance of an incoming call connection. If an incoming call arrives while a subscriber is surfing the Internet, the subscriber ^{receives} ~~receive~~ a pop-up message on his Internet navigation system (on his screen interface ^{to} ~~for~~ the

A Internet, ^{i.e., his} browser) in order to inform him about the call and to provide him with the possibility of interrupting the Internet session and accepting the incoming call. The pop-up contains/is composed of the
5 subscriber number of the calling subscriber. The feature may be assumed to function as follows/.

A The Network Control Platform NCP has the following applications:

- 10 • Information recording application: records that the subscriber is occupied with the Internet and stores the IP (Internet Protocol) address and the E164 address of the user.
- 15 • PSTN proxy call application: acts as ^a proxy agent between the Internet subscriber and the PSTN network in order to carry out the call-related functions.
- The Internet subscriber dials the number which sets up a connection to his ISP POP (Internet Service Provider Point of Presence) as normal
 - 20 - ~~The~~ Internet user sets up ~~an~~ TCP/IP connection of low bandwidth to the NCP: Information recording application via the ISP POP and informs the NCP that it is occupied with the Internet and makes its own IP and E 124 available. This NCP
25 connection is maintained and is used to communicate with the Internet user for an exchange of data/;
 - The user surfs WWW (World Wide Web) pages as normal;
 - 30 - ^A an external subscriber attempts to call the Internet user. The switching device (Switch) determines, by comparing the number of the called subscriber with the ISP (Internet Service Provider) numbers, that the subscriber is occupied
35 with the Internet and directs the external subscriber to the NCP: PSTN proxy call application/

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The purpose of this is to ensure that the external subscriber does not abort the call attempt because ~~said~~ subscriber assumes that no-one is accepting the call/;

- 5 - The NCP/ PSTN proxy call application produces an IP packet and sends it to the subscriber over the Internet. The transmitted IP packet contains the number of the calling subscriber. A connection to the Internet Navigation System (Browser) of the
- 10 called subscriber triggers a menu pop-up and indicates the number of the calling subscriber and provides the subscriber with a button enabling him to accept the call or refuse it/;
- If the subscriber presses the button in order to accept the call, ^{this} information ~~to that effect~~ is transmitted to the NCP. The NCP/ PSTN proxy call application will reconfigure the call ~~The NCP: PSTN proxy call application~~ ^{and} subsequently releases the Internet user from the ISP POP ~~(Internet Service Provider Point of Presence)~~ and brings about a connection, via the interface ISDN-BA, between the external subscriber and the Internet user. As soon as the modem is released, the
- 20 telephone at the Internet user end rings and a normal call is set up if the user accepts the call.
- 25 - The NCP withdraws completely from the call, i.e., there is no longer connection signaling or a bearer connection to the Internet user. If the
- 30 subscriber wishes to set up a connection to the Internet again he must start from the beginning.

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A second embodiment is provided by an advanced message writing display. The subscriber can output an interrogation so that he is informed if an E-mail

35 (letter dispatched in electronic data format) is received from a specific sender or in relation to a specific matter. The subscriber can be informed ^{via} ~~by~~ ~~means of~~ a specific tone when the telephone call is

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accepted or rung with a message which indicates that an E-mail is waiting, or, if the personal computer is set up in such a way

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5 as to start the subscriber E-mail program, ~~in order~~ then to download the E-mail. ~~It is to be noted here that the~~ subscriber may receive the information anywhere, for example, on a business trip. The feature functions as follows.

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The NCP has the following applications:

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- PSTN proxy call application: ^{This application acts} ~~Acts~~ as a proxy agent between the Internet user and the PSTN network in order to carry out the call-related functions.
 - 10 • E-mail signaling application: At the subscriber's request, this application monitors the E-mail of the subscriber and can trigger additional applications in the NCP if ^{this application} ~~it~~ finds E-mail from a particular subscriber or with a particular content.
 - 15 - ~~Via the Internet the~~ subscriber outputs an interrogation ^{Via the internet} to the NCP/ E-mail signaling application, in order to inform ^{the application} ~~it~~ if an E-mail is received from a particular subscriber or with a particular content. The subscriber can also
 - 20 determine how often the E-mail is interrogated.
 - The NCP/ E-mail signaling application monitors the E-mail of the subscriber. If an E-mail with a particular distinguishing feature is received, the NCP: PSTN proxy call application is activated.
 - 25 - The NCP: PSTN proxy call application informs the switching node (Switch) via the ISDN-BA interface, so that ^{this} ~~said~~ node supplies a specific tone to the subscriber if he accepts the call, or the NCP/ PSTN proxy call application can inform the subscriber that
 - 30 an E-mail is waiting. ~~It is to be noted that it is also~~ possible to transmit a message to a pager ^a ~~(mobile~~ receiver which displays alphanumeric characters received by radio) which indicates that an E-mail is waiting, or even to send the E-mail to the pager or to
 - 35 a mobile communications device, for example, a mobile phone.

A fourth embodiment is provided by interrogating personal messages from the call answering service via the Internet. A subscriber who is, for example, on holiday or on a business trip can interrogate messages from his call answering machine at home via the Internet. The messages may be transmitted as an audio signal stream via the Internet. ^{The} ~~It is to be~~ ^{in this agreement} ~~noted~~ that the voice quality is satisfactory ~~here~~ since this process does not need to take place in a real-time mode.

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